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PATENT COOPERATION TREATY  
**PCT**  
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCT-98-10277	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP98/01844	International filing date (day/month/year) 22 April 1998 (22.04.1998)	Priority date (day/month/year) 23 April 1997 (23.04.1997)
International Patent Classification (IPC) or national classification and IPC H01M 4/02, 4/04, 10/40, 6/00, 10/00		
Applicant JAPAN STORAGE BATTERY CO., LTD.		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.  <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).  These annexes consist of a total of <u>9</u> sheets.
3.	This report contains indications relating to the following items:  I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 24 November 1998 (24.11.1998)	Date of completion of this report 24 August 1999 (24.08.1999)
Name and mailing address of the IPEA/JP Japanese Patent Office, 4-3 Kasumigaseki 3-chome Chiyoda-ku, Tokyo 100-8915, Japan Facsimile No.	Authorized officer  Telephone No. (81-3) 3581 1101

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP98/01844

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☐ the international application as originally filed
- ☒ the description:  
pages 1-3,8-27, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages 4-7/1, filed with the letter of 10 May 1999 (10.05.1999)
- ☒ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement under Article 19  
pages \_\_\_\_\_, filed with the demand  
pages 1-24, filed with the letter of 10 May 1999 (10.05.1999)
- ☒ the drawings:  
pages 1-13, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Claims	13-18, 21-24	YES
	Claims	1-12, 19-20	NO
Inventive step (IS)	Claims	13-18, 21	YES
	Claims	1-12, 19-20, 22-24	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims		NO

### 2. Citations and explanations

Claim 1 lacks novelty in the light of Document 1 (JP, 8-153515, A (Toyota Automatic Loom Works, Ltd.), June 11, 1996 (11.06.96)), Document 2 (JP, 8-96795, A (Matsushita Electric Industrial Co., Ltd.), April 12, 1996 (12.04.96)), Document 3 (JP, 7-320788, A (Hitachi Maxell, Ltd.), December 8, 1995 (08.12.95)) and Document 4 (JP, 7-272760, A (Shin Kobe Electric Machinery Co., Ltd.), October 20, 1995 (20.10.95)) cited in the international search report. Documents 1 through 4 disclose an electrode wherein, via an electrolyte holding layer in one of the electrodes of a battery, a groove is formed in the surface opposite the other electrode with at least one end extending to the electrode.

Claim 2 lacks novelty in the light of Documents 1, 3 and 4. Documents 1, 3 and 4 indicate that the electrolytic layer is a separator.

Claim 3 lacks novelty in the light of Documents 1, 2 and 4. Documents 1, 2 and 4 indicate that the depth of the groove is 10µm or more.

Claim 4 lacks novelty in the light of Document 1. Document 1 discloses the feature wherein when a spiral-shaped groove of 0.5 mm is formed in an electrode of approximately 800 mm in length, the outermost position is at approximately 10 mm pitch and the innermost position is

at approximately 3 mm pitch. The proportion of the cross-sectional surface area and the mixture cross-sectional surface area is also identical at 0.2% or more but less than 10%.

Claim 5 lacks novelty in the light of Document 1 through 4. Documents 1 through 4 disclose the feature wherein the groove is a straight line.

Claim 6 lacks novelty in the light of Document 3. Document 3 discloses the feature of a series of grooves in different directions.

Claim 7 lacks novelty in the light of Documents 1 through 4. Documents 1 through 4 discloses a battery having an electrode wherein, via an electrolyte holding layer in one of the electrodes of a battery, a groove is formed in the surface opposite the other electrode with at least one end extending to the electrode.

Claim 8 lacks novelty in the light of Documents 1, 3 and 4. Documents 1, 3 and 4 indicate that the electrolytic layer is a separator.

Claim 9 lacks novelty in the light of Documents 1, 2 and 4. Documents 1, 2 and 4 indicate that the depth of the groove is 10 $\mu$ m or more.

Claim 10 lacks novelty in the light of Document 1. Document 1 discloses the feature wherein when a spiral-shaped groove of 0.5 mm is formed in an electrode of approximately 800 mm in length, the outermost position is at approximately 10 mm pitch and the inner most position is at approximately 3 mm pitch. The proportion of the cross-sectional surface area and mixture cross-sectional surface area is identical at 0.2% or more but less than 10%.

Claim 11 lacks novelty in the light of Document 1 through 4. Documents 1 through 4 disclose the feature

wherein the groove is a straight line.

Claim 12 lacks novelty in the light of Document 3. Document 3 discloses the feature of a series of grooves in different directions.

Claim 19 lacks novelty in the light of Document 2. Document 2 discloses the feature wherein a polymer electrolytic material is combined with a power generation element and then hardened and a battery wherein a positive electrode lying between the above is fixed to an electrolyte holding layer.

Claim 20 lacks novelty in the light of Document 5 (JP, 10-172537, A (Mitsubishi Electric Corp.), June 26, 1998 (26.06.98)) cited in the international search report. Document 5 discloses a battery provided with an electrode having concave and convex parts on the surface of the positive electrode active material resembling a net-shape and having a package of laminated aluminium film.

Claims 22 through 24 do not involve an inventive step in the light of Document 1 and Document 6 (JP, 7-166211, A (Katayama Tokushu Kogyo K.K.), June 27, 1995 (27.06.95)). In trying to obtain the electrode wherein a plurality of linear grooves are formed that is disclosed in Document 1, a person skilled in the art could easily apply the roller having a convex section that is disclosed in Document 6 as a means to producing the linear grooves. Moreover, a person skilled in the art could appropriately carry out the heat processing and set the pressure of the processing period to achieve the required depth according to necessity.

The feature disclosed in Claims 13 through 18 and 21, wherein at least one of the interfaces formed from any two of the positive electrode, negative electrode and electrolyte holding layer is bonded with an adhesive

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containing fine particles, and via an electrolyte holding layer and on the surface of one of the electrodes, a groove is formed in the surface opposite the other electrode with at least one end extending to the electrode is not disclosed in any of the documents cited in the international search report. Moreover, it is not obvious to a person skilled in the art.